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# Neoclassical Difficulties: Tort Deterrence for Latent Injuries\*

W. L. F. FELSTINER and PETER SIEGELMAN

*Economists often claim that the tort system leads firms to provide consumers and workers with the socially optimal level of safety. Moreover, in the case of work-related hazards, employers are alleged to have another source of incentives to take precautions. If wages are sensitive to job-related risks, employers should spend money to reduce such risks when, by doing so, they can save more in wage costs than the costs of the precautions taken.*

*Whatever their merits in other settings, in the case of latent injuries such as workplace exposure to asbestos neither tort nor market are likely to provide an optimal level of safety; indeed, they have failed to do so in the examples we discuss. We find that the introduction of a long delay between the exposure to a hazard and the onset of symptoms introduces a variety of empirical complications that overwhelm the assumptions on which the neoclassical model rests. Our conclusion is thus that comparisons between tort and alternative systems of deterrence/compensation should start from an empirical assessment of how the tort system actually works (and doesn't work), rather than beginning with misleading theoretical claims about the system's optimality.*

## I. INTRODUCTION

The deterrent effect of tort compensation is a pressing social issue and has spawned an immense literature. The particular difficulties posed by latent injuries have generally been ignored in the academic and political struggle although such injuries have affected large numbers of people (Boden and Jones, 1987: 321) and are likely to plague even larger numbers in the future (McCulloch, 1986: 231–33).<sup>1</sup> The thesis of this paper is that latent injuries introduce empirical complications that overwhelm the assumptions on which the deterrent effect of tort compensation found in neoclassical economic theory is based.<sup>2</sup> This point is essentially negative. We are not suggesting that regulation, social insurance, or other schemes are superior to tort as a means of securing an optimal allocation of resources for accident prevention. Rather we argue that the *theoretical* model of tort as the baseline for comparison of alternative systems is misleading because, at least in the context of latent injuries, it cannot work as predicted by the neoclassical model.

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Although the main argument of this paper is that in calculations about safety precautions firms cannot take the long term into consideration, we begin by reciting the case that today's firms and their managers frequently do not even want to do so.<sup>3</sup> This argument has three strands: that American firms are increasingly short run optimizers; that they have conflicting goals and structures that interfere with coordinated efforts at maximization; and that managers confronted by uncertainty often seek personal goals at the expense of organizational ones.

Hirsch (1987) and Drucker (1986) have argued that it has become increasingly irrational for American corporations to make decisions based on long-term considerations. The main effect of investment banker and arbitrageur involvement in corporate ownership is that a corporation's value now depends on its ability to maximize the short-term return on shareholder investment.<sup>4</sup> Hirsch's (1987: 18) case studies demonstrate that the favored path to this goal is the elimination of long term planning, development, and capacity through downsizing, dismantling, and increasing debt. Executives of nearly all large American corporations have responded to this market pressure (Hirsch, 1987: 45-47). As divisions have been summarily eliminated, and company officials fired, often without regard to productivity and experience, managers have responded with a new ethos—that of Free Agent, concerned far more with their own future than the company's (Hirsch, 1987: xvi, 109-10) and ready to leave the company whenever a better offer is at hand.<sup>5</sup> Peters and Waterman (1982: 43-52) have argued that a short-term focus also follows from an over-reliance on superficial analyses and a bias against innovation. American firms rely on cost-benefit analyses that undervalue or ignore long term efforts and benefits (research and development, productive capacity, high morale, company goodwill) that are difficult to quantify in favor of readily available figures (material costs, inventory turnover, sales) that are more easily obtained. The capacity to measure only short run projects precisely leads to analyses that focus on monthly, quarterly, or single year goals. Thus future values are not just discounted to present value, but further discounted because the benefits are so difficult to quantify.<sup>6</sup> The link between future profits and present actions is further weakened by the so-called agency problem—the fact that managers of most firms make decisions rather than the owners, and the interests of the two parties do not always coincide. There is a vast literature on the ways in which firms are structured to reduce this divergence of interests and no consensus about the degree to which efforts to enforce maximization are successful. It is clear, however, that the problem is likely to become more acute as the planning horizon gets longer.

Organization theorists long ago abandoned the idea that firms acted toward a single, coherent goal (see, e.g., Allison, 1970; Scherer, 1980: 29-41). Not only do organizations seek multiple and often conflicting goals, but employees use their power to convert resources to secure sub-organizational objectives. Allison's "government politics model" (1970, ch.5)

recognizes that results are determined by the interplay of influential actors holding influential positions. Players enter the game with different agendas, levels of formal authority, skill, power, and control of crucial information. As in the Cuban missile crisis, the politically modified "score of the game" is often distinct from what any group or person intended, and far from the organization's best interest.<sup>7</sup>

Many neoclassical economists would object to the way these propositions overpersonalize corporate decision-making. Their analysis assumes that firms are forced by competition to try to maximize the present discounted value of future profits. Managers may disagree on goals and seek short-run objectives, but market forces curtail such behavior so that deviations from profit maximization are limited. Market discipline is said to arise from two sources: competition in the market for the products that firms sell and the market for capital in which virtually all firms participate. The basis of product market discipline is simple: "In the austere environment of complete and perfectly competitive markets, there is no alternative desideratum left against which the value of the firm might be traded off." (Nelson and Winter, 1982: 54). Thus, firms that do not minimize costs, for example, cannot generate the market rate of return on their capital at the market price for output, and will sooner or later go bankrupt. Using some ingenious simulation techniques, however, Nelson and Winter (1982) have demonstrated that firms that follow non-maximizing heuristic decision rules can nevertheless survive in the long run, even in industries where many firms are strict profit maximizers. Thus even ignoring changing business conditions and organizational and psychological theory, the neoclassical view that product market competition guarantees that firms will be maximizers is not necessarily correct.

The second source of discipline is the market for capital. In this view, "it is to the external discipline provided by the takeover raider, rather than the internal discipline imposed by [the owner] that society looks for the effective functioning of the [firm]" (Nelson and Winter, 1982: 54). If a firm fails to maximize profits, its stock price will be depressed; it will then be a tempting target for takeover by new owners, who will be able to make a profit by buying at the low price, restoring profit maximizing behavior, and raising the price of the stock they own. Even in theory, however, recent work (e.g., Grossman and Hart, 1980) demonstrates that it is not at all clear how much discipline takeovers, or capital markets in general, can provide.<sup>8</sup>

Furthermore, notions of bounded rationality and statistical ignorance also suggest that firms fail to maximize profits over time horizons as long as those involved in many latent injuries. The uncertainty and complexity of the profit-maximization problem increase exponentially as the planning horizon expands. Simon (1957) and others have argued that such complexity leads to "satisficing" behavior even in the short run because the problem of achieving maximum profit is simply too difficult to solve. Rules of thumb or extrapolation from past practice, rather than an optimizing calculus,

govern business decisions, especially those whose consequences will be felt in the distant future. The body of this paper is a demonstration that the level of complexity in the latent injury context virtually guarantees the impossibility of long-run maximization.

Finally, further doubts about the profit maximizing assumption in the context of latent injuries stem from the nature of the uncertainty involved. Virtually all economic models treat uncertainty in a convenient, but highly stylized fashion. The paradigmatic example is flipping a coin, a case in which the exact outcome (heads or tails) is not known in advance, but the range of possible outcomes and the probabilities of each are given (or can be learned over time). This kind of uncertainty poses little difficulty for model makers. If the agent being modeled is risk neutral, the expected value of the uncertain outcome can be substituted for its uncertain range of outcomes.<sup>9</sup>

Rather than choosing a single action which produces the best average payoff under a range of known circumstances, decision makers for long-term projects such as spending to avoid latent injuries know neither the range of possible outcomes nor the probabilities associated with each. However such choices are actually made, it seems clear that they can not be made as they are modeled in mainstream economics, since the range of possible outcomes and the level of ignorance are far greater than any planner could contemplate.<sup>10</sup> Moreover, most business decisions are

. . . unique, in the sense that [they] are most unlikely to be replicated anywhere else in the economic system, and . . . can never [be] repeated. Actuarial or statistical probability has no application to an experiment which is non-divisible and non-seriable [not repeatable]; it makes no sense to apply the arithmetical processes which belong to actuarial probability to a purely subjective estimate of probability. Carter (1972: 30).

## II. CAUSAL ASSUMPTIONS AND EMPIRICAL REALITY

There is no single authoritative neoclassical analysis of the working of the tort system:<sup>11</sup> Here we abstract what we take to be the key assumptions or requirements of this style of modeling that are particularly sensitive in the context of latent injuries.

Most work in mainstream economics assumes that firms maximize the present discounted value of (expected) profits from the present through the infinite future. Suppose a firm is considering whether or not to spend money today on product safety which will prevent some injury that becomes manifest thirty years hence. The benefits of making this expenditure are the damages the firm will avoid having to pay to injured parties and the litigation expenses it will escape. If these benefits are properly measured and weighed in the firm's calculations, then the neoclassical analysis leads to the conclusion that the firm will decide to spend the socially optimal amount on safety. If there are distortions in the way the firm factors these distant

benefits into its decisions, however, then the amount spent on safety will depart from the optimum.

Now let us examine the operation of these neoclassical assumptions. First, future damages would be discounted to present value. A \$100,000 adverse judgment thirty years in the future would at a 10% discount rate approximate a \$6000 current penalty. A firm ought not then spend more than \$6000 to avoid the harm that thirty years from now will underlie the \$100,000 judgment (Viscusi, 1986: 322).<sup>12</sup>

Second neoclassical theory does not consider workers exposed to toxic substances to be random casualties of capitalist production, but rather people who have to some degree bargained for the harm by accepting extra compensation for the extra risks that they assumed at the workplace (Rosen, 1986: 642). There is considerable empirical support for the proposition that people are compensated to some degree for job risks (see Smith, 1979; references cited in Landes and Posner, 1987: 309). But there are several factors that suggest that we should not abandon our concern for the worker on this account. What is the evidence about the relationship between risk and wages in the latent injury context? Since the theory of equalizing differences assumes a substantial amount of information on both sides of the labour market (Rosen, 1986: 663), is there reason to believe that we stray farther from this condition when the risk involved is latent rather than apparent? Second, are there alternative theoretical formulations that ought to make us suspicious of the exchange of risk for higher wages? We will discuss these and other caveats later in this paper.

What reservations ought one consider about this economic analysis of discounted compensation, wage rates and safety measures? First, there is the unstable nature of the \$100,000 adverse judgment. Maybe it will prove to be \$200,000 or \$2,000,000 or \$50,000. In those cases the reasonable company official ought to spend \$12,000 or \$120,000 or \$3,000 to protect the worker against the risk. The problem is not that the *theory* of deterrence is illogical or that discounting is an inappropriate way to transform future into current values, but that there is no reliable way to determine the future values. Who knows what the legal rules governing the allocation of responsibility or the calculation of damages will be thirty years from now?<sup>13</sup> Asbestos company officials in the US in the 1930s, 40s and 50s were undeterred from putting consumers and workers in jeopardy not because they ignored the legal consequences of their own behavior, but because they did not predict the changes in legal doctrine and pre-trial practice that would facilitate the litigation that eventually erupted.<sup>14</sup>

Are these changes in doctrine and practice of a sort that their effects may be reasonably estimated? Even if they occur over many years, their consequences may be incorporated in rational decision-making if their direction and pace are reasonably predictable. But the changes in tort law are neither even nor unidirectional.<sup>15</sup> The orthodox understanding of the drift of American tort law since World War II is a steady erosion of the fault

concept until the 1970s followed by swift and unanticipated changes in so-called superstrict liability, comparative negligence and its connection to joint and several liability, *Sindell* rules, the explosion in large punitive damages awards, changes in the structure of chapter 11 reorganizations under the Bankruptcy Code of 1978, retroactive waivers of statutes of limitation, the formal organization of plaintiffs' lawyers by type of mass tort and the resources that they have been able to generate and deploy, and the willingness of courts to transform insurance contracts into compensation devices. In the other direction, that is, toward limiting tort recoveries, the US Justice Department has given unusual attention to tort reform,<sup>16</sup> and at the state level we have seen the growth of a well-financed American Tort Reform Association determined to reverse the doctrinal innovations of the past two decades. There are also the research program of the Rand Corporation's Institute for Civil Justice, founded in 1980, on which much of the tort reform rhetoric is based, and the large number of legislatures that have adopted measures to limit the number and level of tort recoveries such as caps on non-economic damages, limitations on contingent fees, mandatory pre-trial arbitration, limitations on punitive damages, facilitating or requiring periodic payment of judgments, prohibiting prejudgment interest, limiting dram shop and municipal liability and modifications to the collateral source rule and of joint and several liability.<sup>17</sup> Just as yesterday's managers grievously underestimated the threat of tort compensation, and underinvested in safety measures, how do we know that their contemporary counterparts are not overreacting to what will prove to be short-term trends in tort recoveries and, as a result, now overinvest in safety. In other words, setting the level above or below which it is inefficient and therefore socially "undesirable" to invest in harm reduction by discounting future projections based on current recoveries is a reasonable process only for analysts who are willing to turn their backs on the enduring volatility of American tort law (see Sugarman, 1985: 566, 585).<sup>18</sup>

Moreover, there are unpredictable changes beyond those in rules that will influence tort compensation of the future. If Friedman's reading of history in *Total Justice* (1985) is at all accurate, then base rate changes in matters such as public attitudes toward risk and compensation can be expected to alter the behavior of juries and the value of tort cases when the relevant time periods are as long as the 20–40 years involved in many occupationally-generated diseases. Whatever the juries of tomorrow may do, it is often not even clear what they are doing today. Firms may and probably do organize and analyze their own recent experience, but the experience of researchers who have studied asbestos litigation suggests that industry, or even multi-firm, data do not exist (see McGovern, 1988: 54): in fact such information is considered more a trade secret than a metafirm asset, despite its obvious utility in predicting long-term exposure of single firms. Insurance and capital markets in theory compensate for a firm's inability or disinclination to respond to the signals provided by future tort compensation. For instance, if firms guard information about risk as a trade secret, rational insurers

ought to insist on such information before providing insurance. Moreover, insurance ought to mitigate the myopia of managers intent on today's profits by focusing their attention on the extent to which today's premiums reflect exposure over time, even long periods of time. Bondholders in theory behave in like manner, requiring higher interest from firms vulnerable to large, future liability claims. The problem with this analysis is that the insurance companies and capital markets are no better able to predict the rules, science and culture of the future, to assimilate the imperfections of the legal system into their calculations or to correct the flaws in wage differentials than are the producers.<sup>19</sup>

Second, economic theory assumes that firms take into consideration the costs of defending future claims as well as compensation that they will be required to pay. Such costs are also unpredictable. Variation in costs arises from factors such as the number of defendants involved in typical cases (the more defendants, the more complicated are both discovery and negotiations), the level of disputing between defendants, between defendants and their insurers and between insurers, and the extent to which defendants and their insurers can coordinate their defense efforts. The Asbestos Claims Facility claimed to have reduced defense costs substantially, but how could asbestos manufacturers in the 1940s predict either the need for or growth of a private dispute processing system like the ACF, or its collapse, or indeed the innovative trial and settlement techniques adopted by US federal courts in East Texas (see Hensler *et al.*, 1985: 60–63) and Ohio (see McGovern, 1986; see also McGovern, 1988 for the methods adopted by the bankruptcy court in Virginia to process the 300,000 claims filed against A. H. Robins). Since the defense costs in asbestos cases in the US through 1982 were virtually as large as the gross amounts paid to plaintiffs and their lawyers (Kakalik *et al.*, 1984: 76), their economic significance is as formidable as it was unpredictable.

Third, there is the problem embedded in the reality that not all injured workers or users will recognize that their injuries are work-related or exposure-related and that, among those who make the connection, not all will seek to recover damages (see Felstiner *et al.*, 1981; Felstiner and Dingwall, 1988). One reason that some injured workers do not sue is the difficulty they may have in exploiting information about firm behavior developed in prior litigation (or on occasion in identifying experienced counsel) because defendants have been able in settlement of earlier suits to insist that the plaintiff's lawyers bring no more cases or assist others who do (see Lord, 1987: 45 (Dalkon Shield); Brodeur, 1985: 242 (asbestos); Yates, 1987: 17 (Bic lighters); Cherniack, 1986: 71–72 (Hawk's Nest Tunnel). The economically efficient penalty would be that amount which reflected the injuries of those who do not claim as well as those who do (Cooter & Ulen, 1988: 460–61). Multiplying damages as in antitrust might, or liberal jury sympathy in fact may, internalize these consequences within firms to an extent. However, given the system's lack of stability no information can be generated on which to base the correct multiple.



The Dalkon shield litigation is instructive about the extent to which claiming behavior is a settled social phenomenon. Before the worldwide publicity required by the bankruptcy judge some 16,000 claims had been brought against A. H. Robins, the manufacturer of the device. After the public notice, nearly 300,000 claims were filed with the court (McGovern, 1988: 26)<sup>20</sup> and even Robins has acknowledged the validity of 33,000 of them (NY Times, 11/7/87). Such huge fluctuations in injury identification and propensity to claim underline the difficulty of making decisions about expenditures to prevent harm that are geared to the present value of an unknown number of injuries that produce an unknown number of claims of an unknown size at an unknown time in the future. The signals that managers need to determine how much to spend on harm reduction are epidemiological, while the signals that are provided by the tort system, flawed as they are, are about claims rather than victims and there is no known reliable method of back-estimating the universe from which the claiming sample came.<sup>21</sup>

Fourth, tort deterrence must come to terms with imperfections in the legal system.<sup>22</sup> For instance, in the asbestos field many injured workers are faced with absolute barriers such as the statute of limitations in their efforts to secure tort compensation. Limitation rules in states such as New York and Wisconsin with large numbers of asbestos victims from World War II and Korean War shipbuilding programs required injured workers to institute suit before they could be expected even to know that they were sick (Mark, 1983: 882).<sup>23</sup> The discounted present value of zero is zero, but no economic theory would tolerate a method for estimating the appropriate level of risk-reduction expenditures that ignores the injuries suffered by large numbers of uncompensated workers.<sup>24</sup>

Fifth, there is the evidence of what firms actually do in response to signals that the tort system in fact provides. We know that in the asbestos industry the response frequently was to suppress scientific and medical information rather than improve working conditions or provide warnings about product dangers (see Murray, 1988: 289; Brodeur, 1974: 142, 207; Brodeur, 1985: 111-24, 145, 276; Castleman, 1986: 61, 88-91, 608). Even more suggestive is Eads and Reuters's (1983: vii, ix) conclusion after studying nine large manufacturing firms "generally recognized as leaders in the safety field" that "although product liability exerts a powerful influence on product design decisions, it sends an extremely vague signal. Because the linkage between good design and a firm's liability exposure remains tenuous, the signal says only: 'Be careful, or you will be sued.' Unfortunately, it does not say . . . *how careful* to be."

Sixth, the sociolegal risk is exacerbated by unpredictable changes in victim vulnerability. For instance, the chances that asbestos exposure will lead to serious illness are strongly related to smoking. Thus the probabilities over the past forty years that people would suffer asbestos-related injuries depended on changes in population smoking patterns undeterminable by asbestos company officials. Furthermore, changes in medical science

cannot be ignored. Although it is probably true that the most threatening latent injuries involve various forms of cancer and cures for many forms of cancer, including lung cancer, have been particularly intractable for medicine, nevertheless the economic consequences of current exposure to toxic substances are affected by unpredictable medical advances and the costs of as yet undeveloped medical therapies.

Seventh, fixing the level of risk reduction is in theory affected by the trade-off between wages and safety measures as well as that between discounted compensation costs and safety measures. If the more dangerous a job, the more that workers will demand in wages, there is a point at which it is in the interest of the firm to reduce the danger rather than pay the added labor costs. This homeostasis at which the costs of accident prevention and labor are minimized will be reached, or even approximated, only if the workers have sufficient information about the risks of their jobs to insist that such risks be incorporated in the wage rate.

Thus the question: how reasonable is it to impute economic calculations about risk to workers? The threshold issues concern who has the necessary information about risk in fact and who has the superior opportunity to acquire it in theory. In the asbestos context, the manufacturers had the information and aggressively concealed it from exposed workers. "A worker may be denied information essential to an informed decision as to whether to continue working in a contaminated environment, as happened to asbestos workers in the late 1950s" (Locke, 1985: 275; see Berman, 1978: 1-4). "Available evidence suggests that few firms make a comprehensive effort to inform workers of the risks they face. For example, no firms tell their employees the average annual death risk they face" (Viscusi, 1983: 71). In fact, corporations traditionally consider laboratory studies of hazards in their own products to be secret information (see *Dow v. Ryan*, 108 S.Ct 344 988 L.Ed.2d 370 (cert. denied 1987), as reported in *NY Times*, 11/17/87, p. 13; *NY Times*, 1/30/88, p. 9 (Liggett & Myers Tobacco Company's 30 years of secret studies on the dangers of cigarette smoking)).<sup>25</sup> Not only may company officials conceal from workers information that they have developed, but they may organize corporate behavior so as not to produce relevant information, e.g., by restricting research (see Brodeur, 1985: 111-124).

Information is itself a complicated variable in any risk-related calculations. The best signal concerning job-related risks is one's own injury experience (Viscusi, 1983: 65). Victims of latent injuries rarely have such experience until it is too late to quit a hazardous job. How many workers know that the history of medicine suggests that the negative health effects of toxic substances are likely to be more numerous and more serious than the first identified risks.<sup>26</sup> Moreover, risks often are stated in ways that are inaccessible to laypeople or mistakenly over-simplified;<sup>27</sup> and recent research indicates that most people systematically misunderstand important probability relationships (e.g., they treat low probability events as having

either a zero or excessively high probability) (see Tversky and Kahnemann, 1974). In view of these considerations it is not at all surprising that asbestos workers secured only small wage premiums on account of the added risks of their jobs (Barth, 1982; Boden and Jones, 1987: 337).

The task of separating economists from their theory is formidable, even in the presence of data that strongly suggest that the theory is inapplicable. Nowhere is this observation more trenchant than in the asbestos case. The *theory* of compensating wage differentials has been a tenet of welfare economics since Adam Smith (Landes and Posner, 1987: 309). Paul McAvoy, onetime member of President Ford's Council of Economic Advisers and Frederick William Beinecke Professor of Economics at Yale, now Dean of the Graduate School of Management at the University of Rochester, *really* endorses the theory. Writing in the *New York Times* (2/82 Sunday Business Section), McAvoy criticized workers for failing to demand higher wages on account of the risks they faced in the asbestos insulation industry. The crisis in the insurance industry produced by asbestos claims was theoretically unimaginable by McAvoy and occurred only because the workers let the theory down. A more empirically inclined social scientist might have concluded that the theory let the workers down.

Setting aside information problems, evidence about the adequacy of compensating differentials for latent injuries is unpersuasive. Empirical tests of the theory of compensating wage differences are inconclusive except for the risk of death (Smith, 1979: 349). Moreover, wage differentials based on risk of death provide poor signals about risk reduction since large variation in risk is associated with small variation in wage differentials (Smith, 1979: 346). Most importantly, Smith (1979: 349) notes that "all the studies on compensating differentials for the risk of death use data on traumatic injuries or known excess death rates—data where the assumption of worker knowledge is plausible." Where such an assumption is implausible, as in the case of latent injuries, employers are not pushed in the direction of safety measures by the threat of increased labor costs if they fail to make risk-reducing adjustments in production methods.

The wage differential theory may have another practical flaw for occupations in which risk and work are inseparable and the work is relatively skilled. The connection between compensating wage differentials and social optimality depends on the availability of safe, but otherwise equivalent, jobs (Boden and Jones, 1987: 333) and such employment is not always available. Boden and Jones (1987: 337) illustrate this point by the case of asbestos insulation workers who were paid a "very small" differential (compared to bricklayers) although 44% of the deaths among insulator members of the relevant union were due to asbestos-related diseases. They attribute this small effect to the "lack of comparable job opportunities."<sup>28</sup>

Moreover, the model of people as interest maximizers is limited in the area of employment decisions. Because work is an important expression of their identity, people often work when to do so is economically irrational.

For an Appalachian coal miner to leave mining for work in a shop to reduce his employment risk would frequently be an unthinkable mode of calculation; his sense of self-worth is as a coal miner, in this case an identity that allows no place for worrying, or being seen to worry, about the risks of the work. Akerlof and Dickens (1982) economic model of cognitive dissonance explains how workers may systematically and "rationally" tend to ignore occupational risk. The model starts with the observation that "workers in dangerous jobs are often quite oblivious to the dangers that are involved" (1982: 308). Cognitive dissonance operates because "persons not only have preferences over states of the world [as is typically assumed in economic theory], but also over their beliefs about the state of the world" (1982: 308). Dissonance reduction requires that the worker in an unsafe job "choose his beliefs according to whether . . . the psychological benefit of suppressing his fear exceeds the cost due to increased chances of accident. [If so] the worker will believe the activity to be safe" (1982: 308). The model demonstrates that in the presence of cognitive dissonance, fully-informed, utility-maximizing workers will nevertheless make suboptimal choices about the amount of workplace risk to which they are exposed.

The theory of compensating differentials predicts that in a situation of perfect information, all positive and negative dimensions of jobs would be factored isomorphically into the wage rate. The risk increment would be equal to whatever additional wage qualified workers would demand, assuming no other qualified workers could be found to work for less. Does this theory ignore the existence of tort and other compensation systems?<sup>29</sup> Where the potential of risk is transformed into the actuality of accident or illness, the consequences to the worker are additional expenses, lost wages, pain and suffering, emotional distress, loss of consortium and incidental damages. Some of these items are the ingredients of workers' compensation recoveries and almost all of them are covered by tort damages before attorney's fees are deducted.<sup>30</sup> If the theory ignores compensation systems it would predict worker demands that are greater than actual demands, although workers surely know something about their health insurance and rights under workers' compensation and tort. If the theory does not ignore compensation, what does it assume that workers do know about these compensation systems? A worker with as good information and data skills as an economist who is also a tort lawyer ought, we suppose, to take into account the value of any preference for no injury over an injury coupled to compensation, the probabilities that he will secure various forms of compensation, the extent to which compensation is incomplete or duplicated and the transaction costs of securing it. Whatever such a theory might assume that workers know about compensation for traumatic injuries, it must assume that workers have at least the same difficulties in estimating compensation for latent injuries that we have in earlier parts of this paper shown to face managers. The obvious conclusion is that a worker cannot be expected to include in wage demands information that is unavailable even to

economists, lawyers and managers; which is to say that the information on which the theory of wage differentials depends almost certainly will be unavailable to those to whom the theory presumably applies.<sup>31</sup>

### III. CONCLUSION

We are skeptical of reliance on the deterrent effect of discounted future compensation and risk-induced wage differentials to determine socially optimal levels of safety when a substantial portion of the information that is in theory to be relied on is opaque or distorted in practice. Information difficulties are related to difficulties in predicting the rules of the future, the so-called sociolegal risk; imperfections in claiming behavior and in the legal system; limitations in information that the tort system provides about future recoveries and transaction costs; and limitations in worker information and in worker assessments of risks and consequences.

These difficulties do not mean that tort compensation has no deterrent effect. If firms were relieved of responsibility for latent injuries caused by their products and working conditions, the care taken with respect to users and workers would almost surely be diminished. But the deterrence claims of laissez-faire economics are much more ambitious than a simple unmeasurable connection between legal responsibility and care. Economic theory asserts that tort compensation and, where workers are concerned, wage rates, tell firms exactly how much care to exercise. Our analysis suggests that tort compensation does not and, if the tort system remains in its current form, cannot provide such guidance.<sup>32</sup>

To reject tort compensation and compensating wage differentials as the basis for safety-related decisions does not demonstrate the superiority of alternatives. Given the acknowledged difficulties in government supervision of worker and consumer health and safety issues (see, e.g., McCaffrey, 1982; Nobel, 1986; Nelkin and Brown, 1984; Claybrook, 1982; Hill, 1987; Eads and Reuter, 1983: x, xi), especially the instability of such programs from one federal administration to another (see Shapo, 1984: c. 10 at 87)<sup>33</sup> and the current tendency toward deunionization of American industry (Kochan, 1985; Ginger and Christiano, 1987; Grenier, 1988), the prospect in the U.S. of relying on government and/or union intervention is hardly encouraging.<sup>34</sup> Nevertheless, skepticism about the deterrent value of tort is politically important. Serious efforts are underway to replace tort with various forms of workers' compensation and social insurance (see Stewart, 1987; O'Connell, 1985, 1987a, 1987b). It would be a mistake in that corner of the debate that is concerned with latent injuries to prefer tort over alternative compensation systems because of its theoretical advantage in deterrence if that advantage were an illusion—if in this instance the hand of the market has in fact disappeared.

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#### NOTES

1. By latent injuries we mean those for which the lag between exposure to the injurious agent and manifestation of harm is measured in years at least, and frequently in decades. Three classes of victims are afflicted with latent injuries caused by business firms—users of business-produced products, workers who make those products, and bystanders. Illustratively, in the first class have been victims of thalidomide, acutane, bendectin, the Dalkon shield, Agent Orange and asbestos; in the second class are workers in asbestos factories and employees of chemical and nuclear plants; bystanders have been victims of nuclear leaks and tests, dioxin leaks and non work-related asbestos exposure. Because of the bar to employee tort claims theoretically imposed by workers' compensation, our analysis is primarily directed to the first and third classes. The situation of workers is introduced because (a) workers injured by asbestos do have a tort remedy against asbestos manufacturers; (b) the exclusivity of workers' compensation is under attack (Barth, 1984: 570); and (c) partial experience rating of workers' compensation makes the economic theory applicable to tort compensation potentially relevant.
2. Deviations from perfect maximizing behavior need not be large to have significant effects. In a highly provocative article, Akerlof and Yellen (1985) ask "Can Small Deviations From Rationality Make Significant Differences to Economic Equilibria?" and conclude that they can. The intuition behind this theoretical result is difficult to explain, but its consequences are profound. No longer is it reasonable to claim, as many Chicago school economists do (see, e.g., Landes and Posner, 1987: 12–13), that "nearly-maximizing" action produces virtually the same results as maximizing behavior.
3. Even in the case of harms with immediate effect some analysts (e.g. Braithwaite, 1984: Fisse, 1983) believe that sanctions (such as fines and tort damages) imposed on corporations are ineffective in controlling the behavior of corporate officials who are themselves unaffected by the penalties.
4. Stein (1988) presents a neoclassical model formalizing these conclusions.
5. Hechinger (1988: 25) has identified the same short-term focus in business schools and their students. A recent report of the American Assembly of Collegiate Schools of Business reported that training "focused too much on the short term at the expense of taking a broader, deeper, long-range perspective." Corporate executives reported that new MBA's were "afraid of actions that cannot be backed up with a detailed quantitative analysis" (Porter & McKibben, 1988: 99).
6. Economic models of criminal justice have also been criticized for ignoring information quality and availability problems and hidden transaction costs (see Coffee, 1980: 440–49.)
7. The psychological literature on the dilemma of the commons (Hardin, 1968) also makes one skeptical that actual behavior follows neoclassical economic logic. In a series of experiments Brewer and her colleagues have shown that in the absence of any of a set of unusual conditions people will destroy a common resource on which they all depend in the long term in order to maximize short-term gratification. These studies imply that managers would sacrifice current profits by instituting safety measures against latent injuries only when assured that managers of rival firms or rival divisions of the same firm were adopting the same course (Messick *et al.*, 1983) or when forced to do so by external controls (Messick and Brewer, 1983) or when limited social distance between decision

makers and victims reduces distinctions in managerial welfare calculation (Brewer, 1979). In other words, in a context of intense competition for short-term results, weak regulation, and hierarchical labour relations, which is the general situation of American industry, this research predicts that managers do not incorporate the very long-term into their profits and safety calculations.

8. In addition, maximization theories must confront "the optimality problem." Although neoclassical models frequently seek to demonstrate that markets produce optimal results, no model can be a model of everything—thus, any demonstration of optimality is at best only a showing that given certain externally generated assumptions, an optimal result is achieved. Consider, for instance, a change in legal procedure that might have an effect on the costs of bringing or defending a suit, on the awards to successful plaintiffs, and so on. If firms act in accordance with traditional economic models, this hypothetical change will lead them to alter their behavior—for instance, to increase their spending on safety or reduce their labor force. Assuming that there are no distortions, the new levels of safety and labor will be optimal given the new rule. However, the original level of safety was also optimal given the old rule. The key point, then, is that "mere" optimality given the existing rules may not be very interesting, even were it consistently attained. To evaluate the social utility of the tort system, one thus needs to look not only at how firms respond, or fail to respond, to any given set of rules, but whether the rules themselves are optimal. Landes and Posner (1987) have recently argued that most rules of tort law are indeed optimal. But, just for example, whether the statute of limitations in asbestos cases should be five years, or fifteen years, or whether indeed there should be any statute of limitations at all, is far from obvious. Green (1988) and Epstein (1986), for instance, look at this question and derive dramatically different answers. If the statute of limitations is set "incorrectly" and firms make maximizing calculations on the basis of the "wrong" rule, the system may appear to be producing optimal results, but will in fact be failing to do so. Moreover, firms attempting to make decisions about how much to spend to prevent latent injuries must optimize not only on current rules, but on expected future rules as well.
9. If the agent is risk-averse, then the problem becomes slightly more complex, but still easily manageable.
10. See Arrow and Hurwicz (1972) and Carter (1972) for some alternative views on decision making under ignorance.
11. For recent surveys of the economics of tort, see Landes and Posner (1987) and Shavell (1987).
12. The theory assumes that the tortfeasor itself pays the damages. If tort liability can be covered by insurance, then the firm ought not spend on safety more than the amount that the liability will increase the insurance premiums discounted from the date of the increase. Where insurance premiums do not vary directly with liability, the theory would predict no deterrent effect to tort compensation. Thus, we ignore insurance in the rest of this paper. This decision is only questionable if insurance company information problems in the tort area are substantially different from those of manufacturing firms and insurance companies are better able than producers to predict the long-term development of tort doctrine, changes in defense costs, legal culture, propensities to sue and worker demands induced by risk. In the asbestos field, insurance companies discussed surcharges on products liability policies (Brodeur, 1985), but there is no evidence that they even shared claims data to form estimates of incidence or compensation.
13. Is this uncertainty like that faced by people who have "no idea" about the height of the Empire State Building? New Yorkers know that the ESB is more than twenty feet and less than a mile high. If asked enough questions they could

construct a probability distribution for their best guesses about its height. If the same kind of probability distribution had been calculated by asbestos manufacturers, it would not have been very useful since the actuality proved to be far out in the tail of any manager's likely expectations.

14. Danzon (1987: 228) notes that actuarially-fair liability insurance is particularly difficult in the case of latent injuries: "The longer the delay between the triggering event . . . and the manifestation of injury and adjudication of claims, the greater the potential for changes in liability rules and damage standards. This sociolegal risk introduces uncertainty as to the mean (the past cannot be used to predict the future) and destroys independence, since trends will similarly affect all policyholders."
15. Nor is the tort law subject to change centralized. To estimate future recoveries, firms would need to predict the relevant jurisdictions in which their behavior would be evaluated as well as the rules of those jurisdictions.
16. After years of rebuffs in Congress, proponents of tort reform on the federal level have adopted a new strategy consisting of modest aims (validating the state of the art defense, promulgating a 25 year statute of repose and limiting punitive damages), trying to assure that the business community speaks with one voice and mobilizing more members of Congress not known for a pro-business orientation.
17. Carroll, 1987: 47-72 lists 189 statutes adopted in 1986 in forty-one states that restrict tort recoveries. These efforts to reduce the number of tort claims and limit recoveries have had limited success in the past (see Adams and Zukerman, 1984; Sloan, 1985; Danzon, 1985; GAO, 1986). More recent research on medical malpractice does report a negative effect on claims frequency and award size (see Danzon, 1986). Since the pace of reform accelerated substantially in 1987 and the effort shows no signs of slackening, its eventual effect may be substantial. See also Nelson, 1988: 686-89 which provides a powerful critique of the data and logic behind the work of the Attorney General's Tort Policy Working Group.
18. Schuck (1986: 185-86) and others have pointed out how in toxic tort cases the combination of the rules requiring a plaintiff to establish causation by a preponderance of the evidence and providing that plaintiffs who meet that standard recover 100% of their damages means that often those damages will be greater or less than the risk created by defendants and that defendants will, as a consequence, be over or underdeterred. Of course, given our view of the deterrence problem, this complication simply makes an impossible calculus worse.
19. "Many of the nation's insurers had known for decades that asbestos workers were dying early, but had kept silent while their underwriters wrote policies for workmen's compensation and comprehensive general liability as fast as they could put pen to paper, and as the premiums from those policies were invested with the full expectation that few, if any, claims for asbestos disease would ever be made." (Brodeur, 1985: 200). Where firms predict that no or minimal damages will have to be paid to victims of occupational disease, it would be prudent for profit maximizers to mobilize a large supply of healthy workers to replace sick employees who can no longer work rather than spend resources on care. This analogy to the use of military manpower has been documented in the construction of the Hawk's Nest Tunnel (Cherniack, 1986). Of course, where there is not perfect substitutability of labor, there is an incentive to care for those with skills in short supply. In the military context, if the pool of soldiers is sufficient, the functional equivalent of tort damages as an influence over care is public opinion (see Lorell and Kelly, 1985: 56, 74, 82).
20. After checking for duplication, claims made in error and without injury, 200,000 claims remained, 193,000 of which had not even "entered the tort system during the 15 years of Dalkon shield litigation" (McGovern, 1988: 26). McGovern



(personal communication), the Special Master in the chapter 11 proceeding, believes that 50,000 of these cases are "lawsuit caliber," suggesting that the tort system in the ordinary course had mobilized about 30% of the potential claimant market.

21. The limiting case analysis may differ from product to product. When Ford produced defective Pintos, it knew how many were sold and what percentage were likely to be defective. It did not know how many lawsuits might result, but it had a worst case scenario to serve as a benchmark. Manufacturers of intermediate products like asbestos and many dangerous chemicals have no way to predict the number of ultimate users and thus no credible worst-case scenario from which to start risk reduction calculations.
22. See Hensler *et al.* (1985: 37–44) for a review of the procedural obstacles to tort claims for asbestos-related injuries. Problems embedded in legal rules are, of course, deficiencies in the legal system, not in economic theory. But they cannot be ignored by economists on that account unless, unlike most lawyers, economists believe in the perfectability of legal rules.
23. The New York statute was changed in 1986 to the discovery rule. New York also created a one-year window for workers barred in the past by the then existing exposure rule. See Chapter 682, Laws of New York, 1986. Between 3000 and 4000 claimants took advantage of the window.
24. See Johnson and Heler (1984) for an analysis of the adequacy and equity of compensation to survivors of 560 asbestos workers who died from workplace exposure between 1967–77. This paper is more a critique of workers' compensation than of tort damages which became an important source of compensation for asbestos workers only in the 1980s.
25. "Companies . . . camouflage their [products'] faults from the [government] inspectors by such means as using scientists who regularly test their products and can be relied upon not to submit distressing results" (Flood, 1988: 813). Firms are even reluctant to grant employees access to their own medical records (Braithwaite & Fisse, 1983: 75) and have been known to conceal clinical indications of occupational disease from them (Berman, 1978).
26. Asbestos and tobacco products are obvious examples. The first connections of these substances were to pulmonary diseases, but they were followed by links to stomach cancer (asbestos) and heart disease (tobacco).
27. See, for instance, The New York Times misstatement of the risks of breast cancer at the time of Nancy Reagan's mastectomy (see Altman, 1987). How many people untrained in probability theory could understand the Love correction (see Love, 1987a,b)?
28. The predicament has become more acute in an era of migratory employers who have little hesitation in exporting dangerous jobs to labor markets where the economic value of life is lower than in the US. Viewed in this light, Bhopal-like disasters are predictable for if expenditures on safety *ought to be* a function of compensation paid to injured consumers, bystanders and workers, then more *ought to be* spent on safety in the US than on a comparable plant in India.
29. Rosen's (1986) review essay in the Handbook of Labor Economics never mentions the effect of tort or workers' compensation or first-party insurance on the theory of equalizing differences.
30. We ignore further complications like the existence in the US of contingent fees and the collatéral source rule, the effects of which are quite surely unknown by workers. There is, moreover, a way of looking at the accident problem in which workers may secure double recovery from the combination of higher wages and tort damages since the wage ingredient of damages would be inflated for the disability period although the worker would not be at risk in that period.
31. Unlike the situation of firms and managers, there are absolutely no competitive forces that serve to check worker deviations from utility maximization.

32. We are not first or foremost in this conclusion. "The [deterrent] value of tort liability . . . is thought on the whole to be negligible" (Ison, 1967: 89; see also references in Sugarman, 1985: n. 12). On the other hand, Landes and Posner (1987, ch. 7) have suggested modifications of the present system which they feel will overcome most of its weaknesses. They argue for awarding probabilistic damages to *all* those who might potentially be affected by a catastrophic or latent tort, regardless of whether they have experienced an actual injury at the time the suit is filed. Thus, suppose a nuclear reactor melts down, exposing 100,000 people to radiation. Twenty-five percent of those exposed will develop cancer thirty years hence, and the monetary damages of those affected will be \$200,000. The Landes and Posner proposal calls for the court to award damages of \$50,000 to each of the 100,000 potential victims, rather than awarding the full \$200,000 to the 25,000 who eventually developed cancer.

While this suggestion may offer an improvement over current practice, it is not a complete solution. First, the most troublesome kinds of latent injuries arise from gradual exposure to an ongoing hazard (asbestos) as opposed to a sudden and discrete event (nuclear meltdown). Second, the scientific and epidemiological data needed to assess future harms are often likely to be unavailable at the time that exposure occurs—in fact, the exposure might not even be widely recognized as problematic until its effects begin to be felt, many years in the future. Finally, Landes and Posner underestimate the importance of legal infrastructure to the prosecution of compensation claims for latent torts. Such claims are not only brought on a contingent fee basis, but generally require significant out-of-pocket investment by individual lawsuits. Any rule change that reduces the recovery per case reduces the incentive for lawyers to hazard such investments unless they are assured of a corresponding increase in the number of clients they represent, a consequence there is no reason to predict. For a description of the problems of organizing class actions in mass tort cases, see Hensler *et al.*, 1984: 52–60. Oi (1984) has raised similar objections to an earlier version of the Landes/Posner proposal.

33. A comparable lack of faith in the stability of regulation of health and safety may not be appropriate for the UK. Regulatory arrangements in Britain derived from tradition more than from formal rule and regulatory agencies are run by civil servants relatively impervious to ministerial direction. Thus the power of a new national government to alter the course and intensity of regulation is limited because it cannot change the regulators and there are by and large no constitutive rules for it to amend. For econometric evidence that British regulation in the form of notices (but not factory visits and prosecutions) makes a difference in the level of ingested lead in exposed workers, see Fenn, 1988: 7.
34. John Braithwaite suggests that the same collective action dilemma that exists with individual corporate actors may apply to individual regulators. To an important extent both corporate and regulatory executives are evaluated by one or a number of "bottom line" measures. If the bottom line disaster does not materialize for thirty years and if the assessment system is (for good reason) unconcerned with second-guessing the executive's assessment of the facts, but only with assessing outcomes, then long latency is an unsolvable performance assessment problem. The assumption that the regulatory executive will strive to be good at achieving the agency's goals is generally not misplaced: performance assessment tends to secure this identity of interest between the individual executive and the interests of his organization. But the longer the latency period, the more likely the executive will have moved on to another agency (or have retired) before the performance assessment system catches up to him and the less plausible the assumption of an identity of interest between the individual and the organization.

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